

## Grass [Continued]

carbohydrates, fats, and plant oils. The plant uses these elements to build new tissues.

It's these tissues that become either a direct source of food for man in the form of grain or are assimilated as roughage by livestock and eventually converted to food in the form of milk, meat, or wool.

Each year plants take in billions of tons of carbon dioxide and transform it into plant material. In the process they discharge a byproduct, oxygen, that sustains animal life on earth.

# How grass shoots up

All plants have an area of growing tissue called a "growing point". This is where new cells are developed.

Grasses differ from most other plants in the location of this growing point. Trees, shrubs, and forbes grow from the outer tips of their branches. But, the growing point of a grass is situated at the base of the plant. New leaves are pushed upward from this point. Not until the grass plant issues a seed stalk does this growing point come within reach of a grazing animal or chance removal by a mower.

Because of these growth characteristics, grasses are better equipped to withstand grazing and recovery than most other plants. As long as this growing point remains intact the grass plant will continue to issue forth leaves, stems, and finally a seed-head.

Where's this growing point? In grasses you can always locate it just above the last completed joint of the stem.

In young grasses and in new growth of perennial grasses, the joints are crowded together near the soil surface. A leaf arises from each of these joints. There may be ten to 15 joints in the first inch of stem.

## Is critical time

As the growing season progresses the joints on some of the plants begin to elongate and push upward to produce a seed stalk. At this time the growing point is placed in a vulnerable position.

Haven't you ever pulled the seed joint of grass and bit the tender stem base? This tender, suc-

culent portion of the stem is made up of newly-formed tissue. It includes the growing point.

Only a small percentage of the plants of a perennial species attempt to produce seed in any one year. This is a protective device.

The remaining plants wait for succeeding years before attempting to produce seed. This is a marvel of nature—and akin to the old proverb about not putting all your eggs into one basket. This way not all the plants are in a vulnerable position at the same time.

## Push to sunlight

Most highly productive forage grasses elevate their growing tissue at some time during the growth period. This places their upper leaves in a higher position. The result: There's more direct sunlight on the plant's solar "collectors" for maximum food production.

This, plus the resulting shading effect, gives taller grass an advantage over shorter plants.

But, when you remove growing tissue by grazing or mowing, growth from that stem is stopped. New growth then has to begin from a dormant bud located at the base of the plant. This is similar to what happens in Spring "greenup".

The growing point of short grasses and successful lawn grasses remains near the surface of the soil at all times. It's never in a position to be removed by livestock or mowers.

The seedhead is elevated by one large, long joint extending upward from the soil surface. An animal may graze off the leaves

without removing the growing point.

So, the plant continues its growth except for a temporary slowing if you remove too many leaves at one time.

Like any living organism, certain natural growth sequences must take place in grasses if you're to obtain optimum forage yields. These include leaf development, root growth, seed production, and food storage.

The first growth that perennial grasses make in the Spring greenup comes from food stored in roots, underground stems, and crowns.

This stored food nourishes the newly-emerging leaves until enough leaf area is developed to manufacture and supply food to the young plant. Of course, as additional leaf area develops, food production is accelerated.

This manufactured food is then distributed rapidly through the plant to feed its growing portions. Most of it is used for developing more leaves and increasing the size of the plant exposed above ground.

The rest is used to grow more roots and extend their depth. This enables the plant to absorb a greater volume of moisture.

When time and conditions are right for stem elongation and seed development, leaf and root growth are somewhat halted.

## Must reproduce

Growth activity then concentrates on rapidly completing the reproductive appendages, the seeds. After the seeds develop, the manufactured food is pumped

(Continued)



## Grass [Continued]

from leaves to roots and the plant's lower portion for storage.

This stored food nourishes the

roots during Winter, keeping them alive. But, its main function is to supply the energy to initiate new, vigorous growth the following Spring—and renew the bounty of Nature.

This requires a strong, healthy, vigorous plant at all times. You can liken this to a healthy, vigorous cow being better able to produce a strong, lusty calf that grows rapidly.

# Pasture management is really leaf management

It's extremely important that enough leaves remain all during the growing season to manufacture food. Many factors influence how much a plant grows: Rain-fall, temperature, soil depth, soil texture, fertility, topography, and the inherent ability of the plant itself.

Yet, even when these factors are optimum, a plant can't grow without a large enough food-producing factory—its leaves.

This is the crux of grass management. The only major factor affecting grass growth that's fully in your control is the maintenance of the size of the leaf area, the plant's solar energy collectors that run the "food factory".

## Leave half!

Except for grass you fertilize and irrigate, all other growth-influencing factors depend on Nature's provisions. Overgrazed grasses simply can't remain healthy, vigorous, and productive

any more than a feedlot steer can gain well on only a maintenance ration.

This point, simple as it sounds, is something you just can't over-emphasize.

The effect of leaf defoliation on plant development has been studied many times. In general, there's agreement that grass production is substantially reduced when you remove more than half the leaf volume by grazing or mowing during the growing season.

Long ago, successful cattlemen coined the phrase, "Take half and leave half".

A later adage, "The half you take will gradually get bigger," is one key to greater production.

An increase of one or two leaves on a grass plant when multiplied by millions of plants is the story of enhanced forage production in a pasture.

## Good roots essential

Root systems are the unseen,

but vital supply lines of moisture and minerals to the plant leaves. The depth that roots penetrate the soil varies between different species.

Roots of many tall grasses, such as Big Bluestem, reach down ten to 14 feet. Grasses with shorter growth characteristics, such as Blue Grama or Buffalograss, may send roots to a four- to six-foot depth.

To some degree, the volume of roots and the volume of leaves produced are in proportion.

It takes an extensive root system to supply water to a large volume of leaves. Depth and volume of roots are greatly influenced by grazing management. Scientific studies point out that excess removal of leaves has an adverse effect on root development.

Each year a portion of a grass plant's roots die and are replaced with new roots. This is a natural function. It's called natural pruning.

# Why 30 percent of all grass roots must be replaced annually

The amount of annual replacement varies with different grasses. But, it ranges from 20

percent to 50 percent of the total root system. It's necessary that these roots be replaced if the plant

is to remain healthy and productive.

In one comprehensive test in



which the effect of leaf removal on root development was studied, it was found that in all grasses the amount of leaf volume removed had a direct effect on the growth of new roots.

All root growth stopped for 12 days when 80 percent of the leaves were clipped. Removal of 90 percent of the leaves stopped all root growth for 18 days.

And, these roots didn't again resume growth until the leaves were once more actively growing. The effects of repeated clippings were much more severe, too, and

the duration of root growth stoppage was increased.

When just 60 percent of the leaves were removed only half of the roots ceased to grow. And, when only 50 percent of the leaves were removed almost all the roots continued growing actively.

This really emphasizes how true, "Take half and leave half" is.

A grass plant produces twice the volume of leaves that it needs to complete its growth functions and remain productive.

But, if you remove more than half of its leaves during the grow-

ing season you deprive the plant of part of its food processing mechanism. And, production of plant tissue—forage—is reduced accordingly.

North America was originally blessed with extensive natural grasslands stocked with an abundance of palatable, productive grasses.

In spite of the fact that much of this land has been converted to producing grains, rangelands still occupy the largest single category of land use in most of the North American continent.

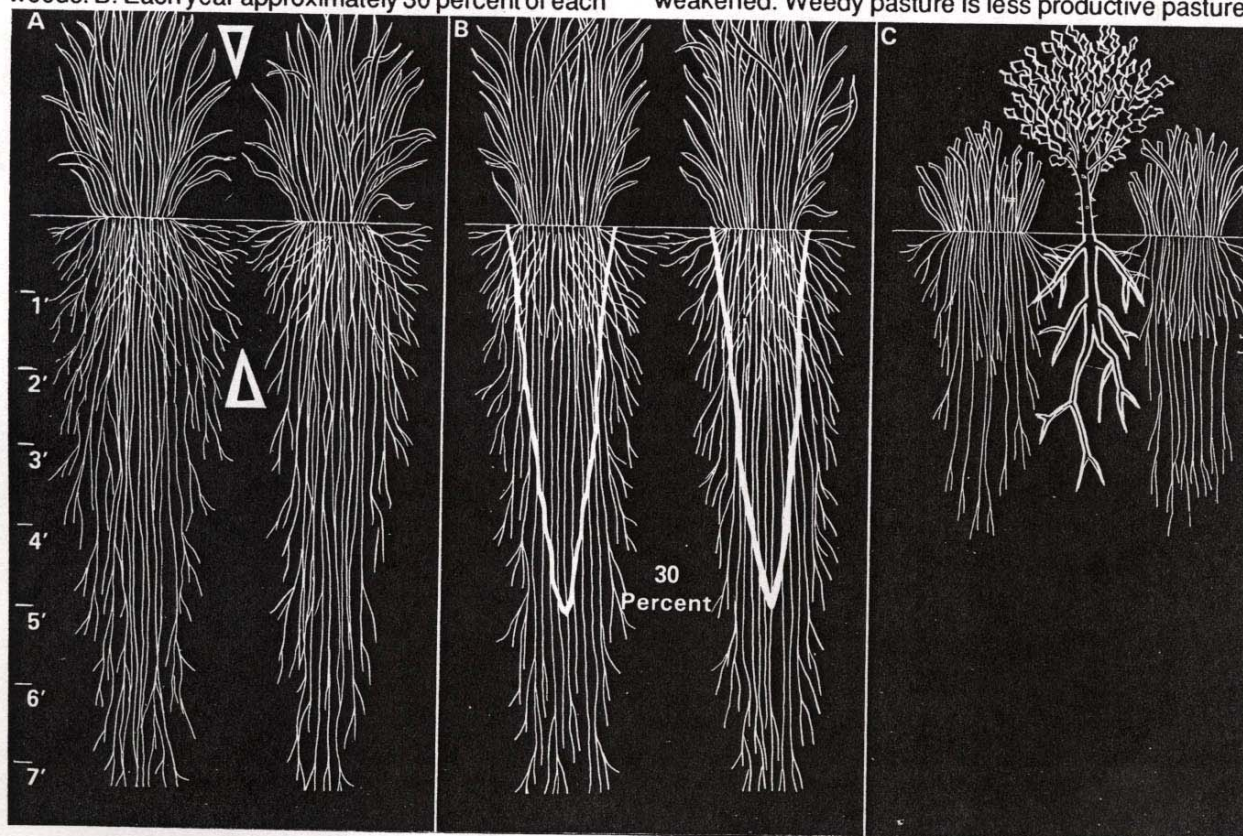
Percent leaf volume removed	Percent root growth stoppage
10%.....	0%
20%.....	0%
30%.....	0%
40%.....	0%
50%.....	2-4%
60%.....	50%
70%.....	78%
80%.....	100%
90%.....	100%

## How grazing affects root growth

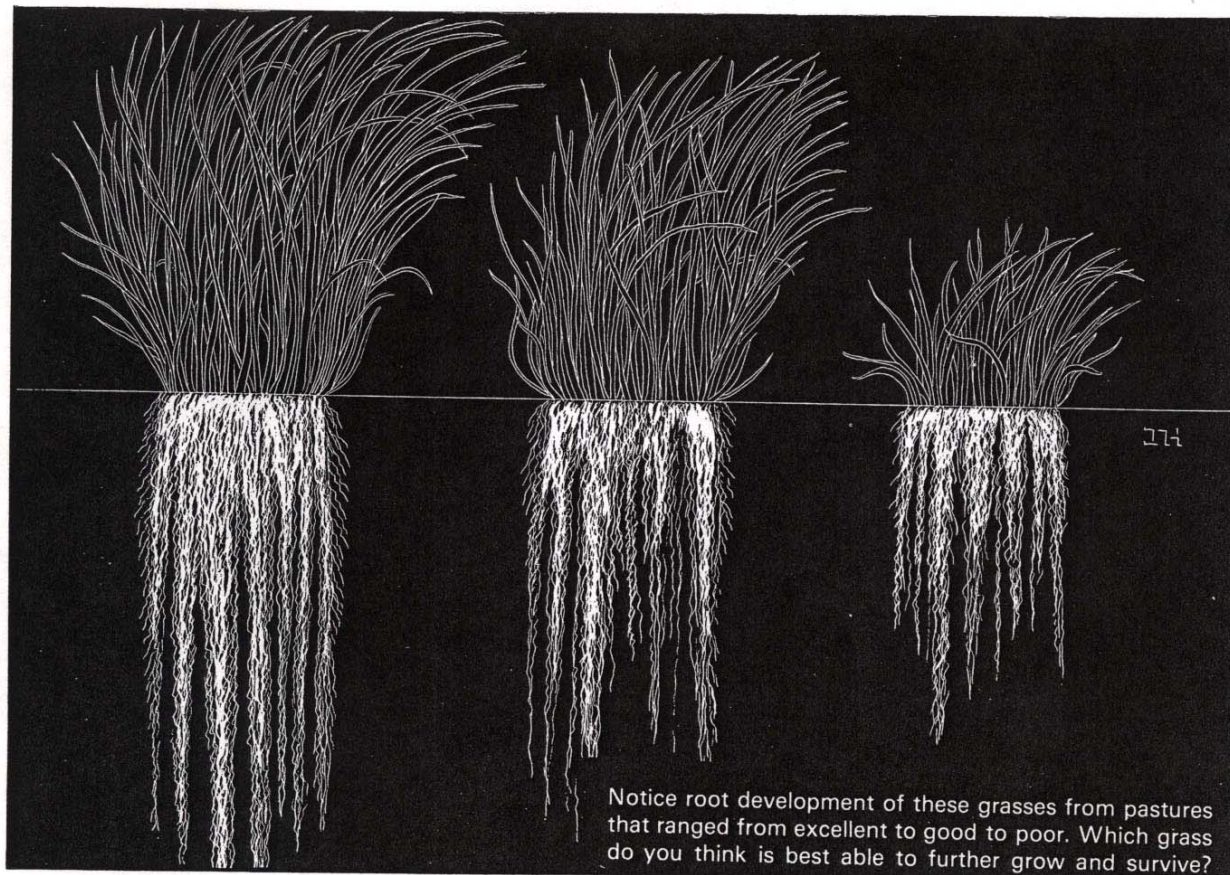
This table illustrates the truth in the old saying, "Take half and leave half." Notice that as you graze off up to half the leaves of your grass that root growth continues unimpaired. But, just look at what happens when you try to sneak in another ten percent "harvest": Half the root growth is stopped. At 80 percent root growth stops completely—and at least 30 percent is needed annually to replace roots naturally pruned. Removing 80 percent of the leaves also stops root growth for 12 days. Taking off 90 percent of the leaves stops root growth completely for 18 days.

A. Although you may think you see quite a bit of "daylight" between grass plants in even your best pastures, actually the plants are properly spaced. Notice how the roots intermingle and the leaf canopy prevents sunlight from reaching other plants such as weeds. B. Each year approximately 30 percent of each

grass plant's root system must be replaced. What happens if you overgraze and the plant's root system not only can't expand, but can't replace that vital 30 percent natural loss? C. Weeds can take hold and grow where grass roots have been too severely weakened. Weedy pasture is less productive pasture.







# Can you set up a management program?

Volumes of research on composition, growth, and techniques of management have been published. Yet these grasslands are still largely underrated in production potential—and undermanaged for the most economical returns.

Unlike most agricultural crops, grass is relatively permanent. You don't need a lot of machinery, seed, or expensive fertilizer to manage grass.

So, our grasslands don't get the constant publicity and support of company sales representatives. Advertising programs for good range management are essentially nonexistent.

As you know, it's hard to compare one livestock operation with

the next. Pastures vary in size, soils, topography, and kinds of grasses produced. Stocking rates and livestock management also differ greatly from place to place.

That's why news about new management techniques for better production efficiency about grass travels rather slowly.

Contrast this with how fast the news about how to increase corn or wheat yields via a new innovation spreads and is adopted around the country.

This means the search for better grazing management is largely up to your own efforts. You can get some assistance from the SCS and Extension Service and numerous consultants are available.

Your management problems

wouldn't be so tough if climate, vegetative production, and market conditions were stable from year to year. But, they aren't.

## Survive drought

When a prolonged drought changes to toad-strangler rains and markets go from boom to bust within a year, management—good management—becomes the art of survival.

Your first step in a management program should be to set some realistic goals: Income, type of operation, kinds of livestock, and relative numbers. Then inventory your forage resources. Explore and develop ways to overcome your grazing problems



# What you can learn from livestock grazing habits

How your cattle or sheep graze is influenced by a number of things: Types of vegetation; topography; location of water, salt, and minerals; shade; prevailing wind directions; and routine grazing habits.

## Cattle range widely

On the average, during a 24-hour Summer day a range cow spends six to ten hours grazing while traveling two to five miles. She'll spend a little more than 12 hours or half of her day resting and ruminating.

During the rest of her 24-hour day a cow will travel, drink water, lick salt and minerals, and rub and nurse her calf.

Cows generally have two main grazing periods. One is from sunrise to midmorning. The second is from late afternoon until sunset.

However, short sporadic grazing periods at other times aren't uncommon. Cows may also graze for a short period during the night.

How long cattle graze is generally determined by the temperature. Usually they'll spend more time grazing on cool, cloudy days than on hot days.

Cattle prefer to graze level areas rather than hilly, rocky terrain. So, most pastures have variations in topography that affect cattle grazing routes.

Portions of a pasture may be heavily used, while other portions may be only lightly grazed by your cows. You can overcome most of this distribution problem by careful location of water, salt, and mineral facilities. You may even have to resort to fencing to even up grazing distribution.

Cattle usually travel to water to drink twice daily. If their water supplies are limited, they'll have to return to the same areas twice each day. This usually results in spots of overgrazing.

As a rule, cattle go to salt and minerals once a day. And, it's been proved that salt locations don't have to be located near water.

Four to eight hours generally elapse between taking salt and watering. So, this means you can use salt locations as a grazing distribution incentive for cattle.

Locate your salt and mineral feeders in areas that are more lightly-grazed than normal. This is usually a considerable distance from water. Putting your salt boxes near water only intensifies grazing in that area.

Because most breeds of cattle have few sweat glands, they rely on wind to circulate air around their bodies for cooling. That's why cattle prefer to keep either their sides or muzzles toward the direction of the wind most of the time while they're grazing or standing.

## South is popular

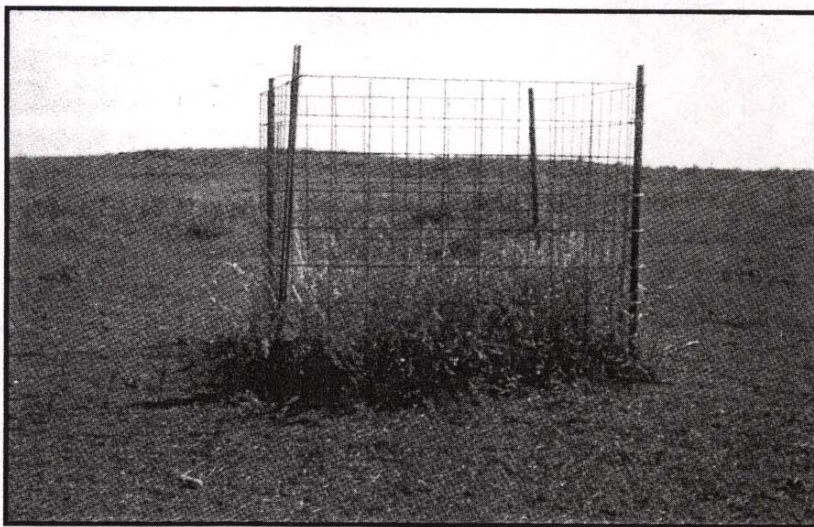
In the Great Plains, for example, the prevailing Summer winds are from the South or Southwest. The

South half of any pasture is usually grazed more heavily than the North half due to this tendency of cattle to graze into the wind.

Cattle, like you, have certain foods they prefer. They'll almost always eat certain grasses first. Often a preference for a particular type of plant will change as the grass reaches a different stage of growth.

Selecting one kind of grass over another during the growing season has a profound, long-term effect on the makeup and production of a pasture. This results in a competitive advantage for the plants not liked so well. When the leaves of a grazed plant are removed to the point that growth is retarded, the plant loses its battle for light and moisture to less palatable, ungrazed plants.

The consequence: Gradual weakening and thinning of preferred plants with less desirable species taking over. Carried to extremes, overgrazing for years can change a prime pasture into one of low-productivity and less desirable forage.



Just how much are your pastures producing and how much is your livestock removing? Put up a "grass gauge" of woven wire and leave it ungrazed for the rest of the Summer. A glance will answer your questions.